

GRADE 10 (MPM2D)

SECONDARY SCHOOL

MATHEMATICS

TESTS AND EXAMS

(WITH COMPLETE SOLUTIONS)

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TEST #6

1. State the direction of opening, the vertex, the equation of the axis of symmetry, the domain and range, the maximum/minimum value and when it occurs and the vertical stretch/shrink :

a) $y = 2(x-3)^2 + 5$

b) $y = -\frac{1}{2}(x+4)^2 + 1$

c) $y = -3(x-2)^2 + 6$

2. Sketch the following graphs :

a) $y = (x-3)^2 - 4$

b) $y = -2(x+4)^2 + 8$

c) $y = \frac{1}{2}(x-2)^2 + 5$

3. Write each equation in the form $y = a(x-h)^2 + k$.

a) $y = x^2 + 6x + 2$

b) $y = 3x^2 + 24x + 5$

c) $y = -2x^2 + 10x + 3$

4. Given the height of a baseball as a function of time, $h(t) = -5.2(t-2.5)^2 + 33$ where h is the height in metres and t is the time in seconds since the ball was hit :

a) What is the maximum height of the ball?

b) When does the ball reach the maximum height?

c) How high was the ball when it was hit?

TEST 6 Solutions

1a) $y = 2(x-3)^2 + 5$

opens up
vertical stretch $\times 2$

vertex $(3, 5)$

Axis of symmetry: $x = 3$

Domain is \mathbb{R} .
Range: $\{y \mid y \geq 5, y \in \mathbb{R}\}$



minimum values when $x = 3$

b) $y = -\frac{1}{2}(x+4)^2 + 1$

opens down
vertical shrink $\times \frac{1}{2}$

vertex $(-4, 1)$

Axis of symmetry: $x = -4$

Domain is \mathbb{R} .

Range: $\{y \mid y \leq 1, y \in \mathbb{R}\}$



maximum value 1
when $x = -4$

c) $y = -3(x-2)^2 + 6$

opens down
vertical stretch $\times 3$

vertex $(2, 6)$

Axis of symmetry: $x = 2$

Domain is \mathbb{R} .

Range: $\{y \mid y \leq 6, y \in \mathbb{R}\}$



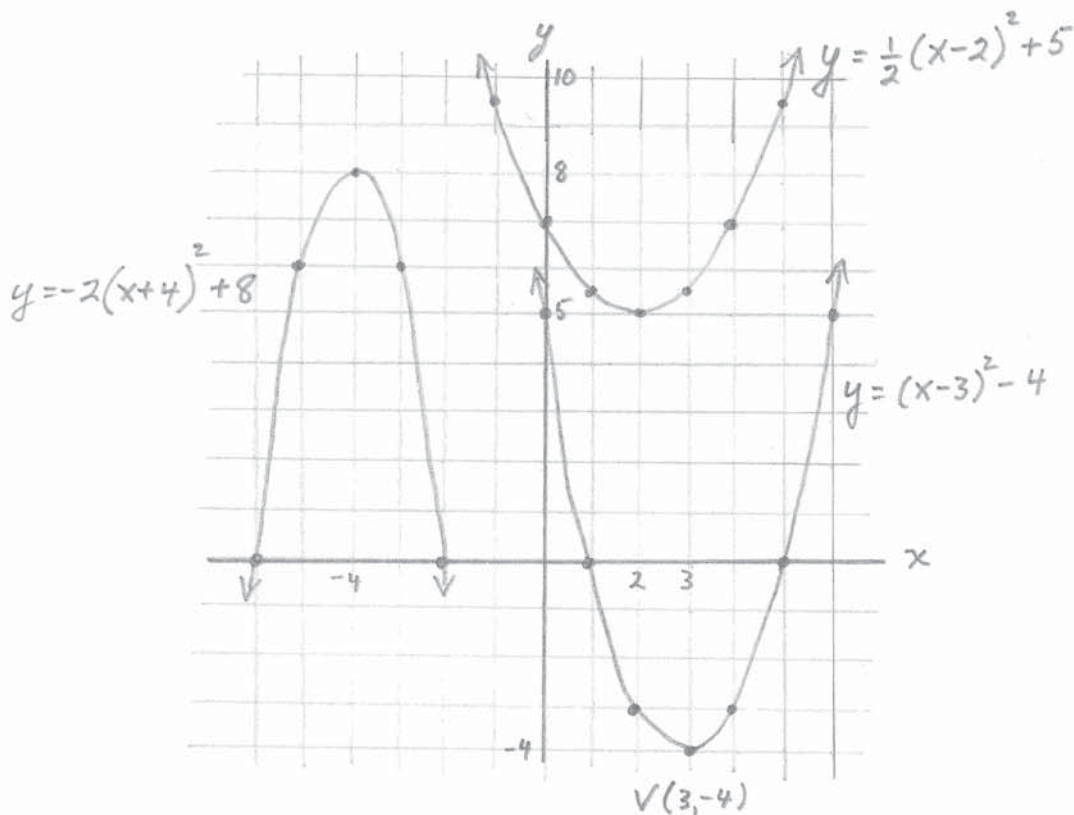
maximum value 6
when $x = 2$

TEST 6 Solutions

2.

The pattern for $y=x^2$ starting from the vertex is:

over 1 up 1
 over 2 up 4
 over 3 up 9



a) $y = (x-3)^2 - 4$

$V(3, -4)$

This graph is the same shape as $y=x^2$.

b) $y = -2(x+4)^2 + 8$

$V(-4, 8)$

This graph opens down and has a vertical stretch $\times 2$.

over 1 down $2(1)=2$
 over 2 down $2(4)=8$
 over 3 down $2(9)=18$

c) $y = \frac{1}{2}(x-2)^2 + 5$

$V(2, 5)$

This graph opens up and has been shrunk by $\frac{1}{2}$.

over 1 up $\frac{1}{2}(1)=\frac{1}{2}$
 over 2 up $\frac{1}{2}(4)=2$
 over 3 up $\frac{1}{2}(9)=4.5$